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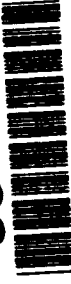
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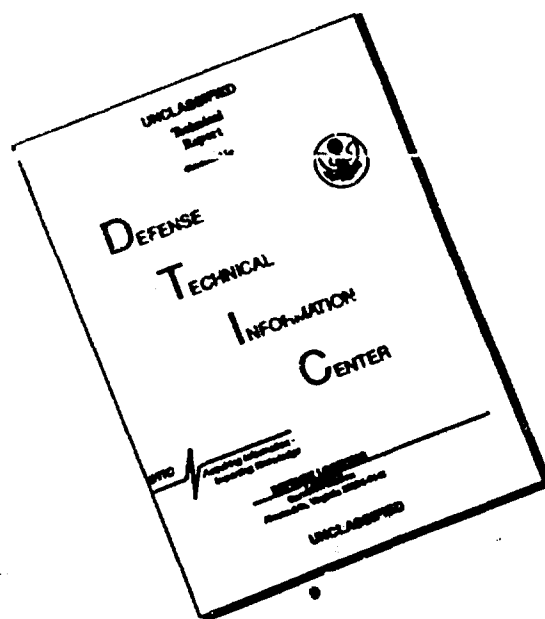
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13. ABSTRACT (Maximum 200 words)

During 1992, a series of workshops was conducted in support of the Defense Modeling and Simulation Office (DMSO) to determine the modeling and simulation (M&S) needs of the defense M&S community. This community is partitioned into five major areas: Education, Training and Military Operations (ETMO), Research and Development (R&D), Test and Evaluation (T&E), Production and Logistics (P&L), and Analysis. Each of these areas has a Functional Working Group (FWG) representing its interests to the DMSO and other interested parties. Workshops were conducted to assist the FWGs in determining the "requirements pull" to be considered in the development of the DMSO Master Plan.

This report presents the results of the Education, Training, and Military Operations (ETMO) Workshop in developing Modeling and Simulation needs for the ETMO community. The report consists of an executive summary, the body of the report, and six appendices. The executive summary briefly states the objective, structure, methodology, and process flow of the workshop and summarizes the workshop results. The body presents the workshop objective, describes the workshop structure and process flow, and presents an expanded summarization of the workshop results.

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REPORT ORGANIZATION

This report presents the results of the Education, Training, and Military Operations (ETMO) Workshop in developing Modeling and Simulation needs for the ETMO community. The report consists of an executive summary, the body of the report, and six appendices. The executive summary briefly states the objective, structure, methodology, and process flow of the workshop and summarizes the workshop results. The body presents the workshop objective, describes the workshop structure and process flow, and presents an expanded summarization of the workshop results. Appendix A lists the consolidated results as prepared by a review panel following the workshop. Appendix B lists the workshop participants and other involved personnel. Reports of the four working groups are presented in Appendices C through F. Appendix C contains the results of the Joint Training Working Group. Appendix D presents the results of the Service Interoperability Working Group. The results of the Education Working Group are given in Appendix E. Appendix F contains the results of the Working Group on Mission Planning and Rehearsal.

EXECUTIVE SUMMARY

OBJECTIVE

The objective of the Education, Training, and Military Operations (ETMO) workshop was to identify the modeling and simulation (M&S) needs to support ETMO community requirements.

STRUCTURE

The ETMO workshop was divided into four working groups: Joint Training, Service Interoperability, Military Education, and Mission Planning and Rehearsal. Mission Planning and Rehearsal refers to preparation for assigned missions, not training. Joint Training is in the context of training for potential assigned missions in support of the warfighting CINCs. Service Interoperability has to do with tasks concerning interaction of two or more services. The Military Education working group concerned itself with the teaching process. Each working group identified M&S needs to support the group's assigned ETMO area.

METHODOLOGY

All ETMO working groups were briefed on a recommended approach consisting of the following steps to identify M&S needs.

Step one: develop Mission Essential Task Lists (METL).

Step two: determine required supporting tasks for each METL.

Step three: describe the training environment needed to support the METL.

Step four: identify M&S limitations to the support the METL.

Step five: from the limitations, prepare a list of needed M&S characteristics.

Following the workshop, a small group of representatives from the ETMO community met to consolidate the workshop results. This review panel identified nine common primary M&S needs of the ETMO community.

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SUMMARY RESULTS

The consolidated results for the nine common primary areas identified by the ETMO review panel are summarized below.

M&S Integration

M&S integration was discussed from several perspectives. The first of these is the integration of multiple constructive simulations to attain a joint capability (e.g., the Aggregated Level Simulation Protocol (ALSP)). Next there is the integration of constructive with virtual simulations and live play. And then there is the integration of one or more of the three simulation classes (constructive, virtual, live) with the real-world C^4I and weapons systems.

The integration of the three classes (constructive, virtual, live) of simulations is going to require an open systems architecture. The architecture must provide a seamless interface between the simulations, players, and the C^4I system. The simulations that interface with the real-world C^4I systems should be capable of using data evolved from real-world intelligence-gathering sources.

Database

To make the most of M&S capabilities, a truly global set of databases is required. World-wide data are required on terrain, logistics (current position, mobility, sustainment, etc.), threat characteristics, location, threat logistics, civilian cultural and economic data, and more. The size and cost of such a comprehensive set of data require that this data be common, standard, and reusable. Because of the man hours associated with translating data into a form that is usable by a particular model or simulation, automated development of databases, or the conversion of data from common databases, is required to support specific models and simulations. The modification of data from common databases leads to the requirements to manage both common databases as well as databases for specific models and simulations. Required database management functions include data retrieval, archiving, and configuration control. Throughout the processing of data, traceability of data must be maintained.

Common Tools

A follow-on need to that of common data is for a common set of M&S tools. In preparation for an exercise or training, the M&S practitioner needs automated scenario database generation and graphical user interfaces to monitor and control the preparation and processing of data. During an exercise, the controller needs specialized tools to manage the flow of the exercise such as monitoring the locations of units and weapons platforms, controlling the simulated exercise environment, controlling the reconstitution of "destroyed" units, and tracking ground and perceived truth. The capability is needed to capture selected data during an exercise, so that selected details may be reviewed through playback; evaluation tools may be used to assist the understanding of what and how well individuals or groups performed, and standardized portions of after-action reports may be automatically generated.

Environmental Representation

The environmental representation in M&S should be both improved and radically altered. Improvement should come in the form of increased scope of environmental representation which should include a full range of natural (weather) and manmade (e.g., electronic warfare) environments. Standardized algorithms and models of environmental effects on sensors and systems need to be incorporated into M&S. The radical alteration of the environmental effects representation must come about to ensure that when models and simulations are intermetted, the simulated environment is consistent for all models and simulations.

New Functionality

Historically, combat simulations have been played in a limited number of scenarios, with a very popular one being that of high intensity warfare in Central Europe. The current changing situation brings new types of missions and the need to be able to look at the deployment of a CONUS-based force. These changes require that whole new areas must be modeled that were not included before. Social, economic, and political models are needed to support commanders in their decision making. M&S functionality needs to be extended to the full spectrum of military operations to include non-combat operations. The mobilization and deployment of resources should be included as part of the military operations functionality of M&S. Military operations M&S should include the seamless integration of intelligence models that also include predictive intelligence modeling. To reflect the complexities of real world situations, M&S should allow multi-sided player representation.

Behavioral Representation

Improved human and organization behavioral representation is another need identified by the workshop. Behavioral representation is needed to provide a realistic opposing force, extend the battlefield for friendly higher, lower and adjacent forces, and to have these forces react to changes in a realistic manner. M&S needs to incorporate threat reactive and active models. Blue non-adaptive models (models which avoid negative training) are required to examine the execution of mission critical functions and operations. Behavioral representation needs to include staff, support, and agency functioning in response to changes occurring during the course of a scenario. The M&S practitioner should be able to choose from "playing the computer" with intelligent forces (IFOR), limited direction or input from the operator with semi-automated forces (SAFOR), or replacing behavioral representation with a man-in-the-loop. It should be possible to select the amount and detail of input and output data by force component.

Security

The efficient use of intermetting of M&S, global databases, and multiple players raises the issue of data security. The global nature of databases will lead to different levels of classification of data included in different databases. Access to the classified data must be controlled. A system of selectable transparency is needed to allow users with limited access to "see" only the portion of the data that is meant to be accessible. This also indicates the need for multi-level security within the M&S intermetted architecture.

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Infrastructure

A well-defined M&S infrastructure needs to be developed that will ensure easy access to M&S information, data, and models. M&S should be established as a secondary military specialty to ensure the availability of personnel with in-depth M&S expertise. The applicability and use of M&S should be included as part of professional military education.

Attributes

The ETMO working groups also identified a series of needed M&S attributes for the community in general. M&S must be affordable; this implies compromises on the fidelity and breadth of M&S capabilities in light of fiscal constraints. A standardized human-machine interface will both increase the number of personnel that use M&S and reduce M&S costs by limiting requirements for training people on how to use M&S. Event-stepped models were favored due to the time span to be covered in a simulation, an example being given of the need to simulate military operations from mobilization to redeployment in a period of minutes. Model speeds are expected to range from slower than real time to much faster than real time (30 days of operation in an hour). The M&S needs to be monitorable, interruptable, and capable of re-baselining at the direction of the M&S practitioner. The scope of models needs to be extended so that multiple theaters of operations can be included in one scenario.

INTRODUCTION TO ETMO WORKSHOP RESULTS

BACKGROUND

- Invitation to ETMO Modeling and Simulation Workshop from the Chairmen, ETMO, and the DMSO

- ETMO Modeling and Simulation Workshop is the second of five workshops sponsored by DMSO

- Participants of ETMO Modeling and Simulation Workshop identified actions required to produce better modeling and simulation support to ETMO in the areas of

    - Joint Training
    - Service Interoperability
    - Military Education
    - Military Planning and Rehearsal

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BACKGROUND

The Defense Modeling and Simulation Office (DMSO) sponsored the Education, Training, and Military Operations (ETMO) Modeling and Simulation (M&S) Workshop, reported in this document, as a forum to identify ETMO modeling and simulation requirements.

The Chairmen, ETMO, and DMSO invited the participants (listed in Appendix B) to the ETMO M&S Requirements Workshop.

The DMSO sponsored the ETMO M&S Requirements Workshop as the second in a series of workshops in five functional areas (Education, Training, and Military Operations; Research and Development; Test and Evaluation; Production and Logistics; and Analysis). The output from this workshop will be used by the ETMO Functional Working Group (FWG) to guide the DMSO in promoting the effective and efficient use of modeling and simulation in the Department of Defense.

Participants were asked to identify and prioritize requirements, deriving these from the Mission Essential Task Lists (METLs), the supporting tasks, and the modeling and simulation characteristics. Requirements addressed activities that should be funded in the near (zero to five years) and far term (beyond five years).

The workshop was conducted during the period 16 - 18 September 1992.

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OBJECTIVE

The objective of the education, training, and military operations (ETMO) workshop was to identify the modeling and simulation needs to support ETMO requirements

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OBJECTIVE

The objective of the ETMO workshop was to identify the modeling and simulation (M&S) needs to support ETMO requirements.

STRUCTURE

- Four working groups

  - Mission Planning and Rehearsal
  - Joint Training
  - Service Interoperability
  - Military Education

- DMSO sponsored ETMO workshop review panel

STRUCTURE

The ETMO workshop was divided into four working groups: Joint Training, Service Interoperability, Military Education, and Mission Planning and Rehearsal. Mission Planning and Rehearsal refers to preparation for assigned joint missions, not training. Joint Training is in the context of training for potential assigned missions in support of the warfighting CINCs. Service Interoperability has to do with tasks concerning interaction of two or more services. The area of Military Education is concerned with the teaching process. Each working group identified M&S needs to support the working group's assigned area within ETMO.

After the workshop, DMSO sponsored a panel to review the workshop results. The review panel prepared a consolidated list of M&S needs for ETMO. The panel results are included in Appendix A.

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RECOMMENDED PROCESS FLOW

- Determine Mission Essential Task Lists (METL)

- Determine supporting tasks

- Evaluate the training environment that supports the METL

- Determine M&S limitations

- Determine needed M&S characteristics

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RECOMMENDED PROCESS FLOW

All ETMO workshop working groups were briefed on a recommended approach to determining M&S needs.

The first step was to develop Mission Essential Task Lists (METL). Each group member was asked to independently list the mission essential tasks representative of the working group subject area. The working group chairman then asked each individual in turn for one mission essential task that had not previously been brought up.

In the next step, the group went over the METLs one at a time and listed the supporting tasks required for each METL.

The third step involved a review of the METLs and supporting tasks by the working group participants to determine if M&S can be used to effectively and efficiently assist training in support of the METL and whether M&S is currently being used. The group then described the general training environment needed to execute the METL and supporting tasks.

From the examination of the environmental description developed in the third step, the working group was then asked to identify any limitations to the use of M&S to the support the METL. Further, they looked at what future enhancements and/or additions would significantly benefit their use of M&S.

From the limitations, each working group prepared a list of characteristics/attributes of modeling and simulation requirements to effectively and efficiently support the needs of ETMO community in the area of interest.

The results of the working groups are included in appendices C through F.

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SUMMARY OF RESULTS

- **M&S Integration**

  - Live play and simulation interactions
  - Distributed, interoperable, open system architecture
  - Data evolve from real world sources
  - Seamless interface with C4I

- **Database**

  - Global
  - Common reusable databases (e.g., civilian, logistics, threat, forces)
  - Use of real world data (representative in some cases)
  - Automated development of databases and scenarios
  - Archival, retrieval, configuration management
  - Traceability

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SUMMARY OF RESULTS

M&S Integration

Several perspectives were discussed regarding the integration of M&S. The integration of multiple constructive simulations to attain a joint capability is one perspective, the example being given of the Aggregated Level Simulation Protocol (ALSP). The integration of constructive with virtual simulations and live play is another perspective. A third perspective or level of integration is that of one or more of the three types (constructive, virtual, live) of simulations with the real-world C^{4}I and weapons systems.

The workshop identified a common need for M&S to provide an environment that combines live play and simulations. All training is expected to benefit from the use of simulated environments, units, and unit commanders to represent a more realistic exercise. Ideally, personnel should not be able to differentiate between live play and M&S. M&S used for education, planning, analysis, training, and mission rehearsal should have a compatible look and feel. The same, or variants of the same, M&S and data should be used in each of the areas.

An open system architecture that allows distributed and interoperable M&S is required to support the wide diversity of military operations. M&S capabilities are expected to develop as separate modules such as command post simulations, weapon platform simulations, and environment simulations. An open M&S architecture will allow M&S capabilities to be combined as part of training exercises and to support military education.

The use of M&S to support ETMO, and, in particular, preparation for military operations requires the use of real world data. The use of M&S modules should be seamlessly integrated into the military organization's C^{4}I structure, allowing the use of either exercise data or real world data.

Database

M&S is often limited by data availability. Databases are required that are geographically global in extent and cover a wide range of subjects. The databases should use real-world data that is continually updated to reflect changing situations. However, security considerations may require the use of representative data for exercises and training.

The availability of databases for M&S is often limited by the labor intensive requirements to generate and maintain databases. Automated database development, archiving, retrieval, and configuration management are required to address the database bottleneck problems.

The sources, and history of assumptions, used to develop the databases are as critical as the data itself. Therefore, M&S requires data that can be traced to the data source to allow verification of the applicability of the data.

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SUMMARY OF RESULTS
(CONTINUED)

- Common tools

  - Selectable data capture, playback, and after action reporting
  - Graphics
  - Exercise management aids
  - Automated scenario generation
  - Embedded training feedback and evaluation tools
  - Automated database development

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SUMMARY OF RESULTS (CONTINUED)

Common tools

The ETMO workshop working groups independently identified a common set of M&S tools, or utilities, required to support ETMO.

The M&S user needs the capability to "playback" user selected portions of the simulation and to capture critical data from the large amounts of data included in any model or simulation. Both automated after action reports of typically required data, and selectable data capture to identify the "why" of a particular result, are tools required by all users of M&S.

Graphical presentation of data is a standard requirement to allow quick assessment of relevant data.

Exercise management aids are needed to allow the exercise controller to track both live exercise players and simulated players. During the exercise, the exercise controller needs to monitor deviations in the exercise scenario, provide direction to units within the exercise, and have real-time evaluations on unit effectiveness. After the exercise, analysis tools are required to identify lessons learned from the exercise.

Automated scenario generation is needed to reduce the labor requirements to create a scenario and to increase the fidelity of scenarios while maintaining traceability back to data sources and assumptions.

All M&S will need to have embedded training feedback and evaluation tools. Each simulation within the open M&S architecture will have more internal data than data shared with the open architecture. Therefore, each model or simulation is expected to include training and evaluation tools to allow access to this data.

Finally, automated database development is expected to be critical to allowing a wide range of M&S applications by eliminating much of the labor associated with the development and modification of databases.

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SUMMARY OF RESULTS
(CONTINUED)

- Environmental representation

  - Environmental databases
    - -- Weather
    - -- Light conditions
    - -- Terrain
    - -- Sea
    - -- EW
    - -- Thermal
  - Effects on sensors and systems
  - Development of standards and models
  - Support interoperable simulation

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SUMMARY OF RESULTS (CONTINUED)

Environmental representation

The difficulty in providing good environmental representation in M&S was viewed as a combination of database and model problems. Each model and simulation is impacted by a simulated, physical environment. The quality of the simulated environment needs to be improved through better databases and better models of the interaction of simulations with the environment.

Geographically global databases are needed to represent weather, light conditions, thermal conditions, terrain, and sea states. Electronic Warfare (EW) databases are also required to create the expected threat (and friendly) electromagnetic environment.

The effects of local environment characteristics on sensors and systems need to be included in the models and simulations. Efficient development and utilization of environmental databases and models requires that the databases and models be developed as a standardized set.

With the establishment of data standards, interoperable simulation can use a centralized environment model such that all players encounter a consistent environment. For example, when there is rain (either real world or simulated play), all ground vehicles encounter mobility constraints, aircraft encounter clouds and rain, and sensors encounter appropriate weather effects. This vision of interoperable simulations needs to be supported to ensure efficient and realistic environmental representation.

SUMMARY OF RESULTS
(CONTINUED)

- New functionality

  - Social, economic, and political models
  - M&S should cover complete spectrum of military operations for all regions of the world
  - Mobilization and deployment process
  - Seamless integration of INTEL models
  - More than two sided interactions
  - Predictive intelligence modeling capability

- Behavioral representation

  - Behavioral representation in threat specific models and non-adaptive behaviors for blue
  - Behavioral representation simulation of other staff, support, or agency functions
  - Selectable IFOR, SAFOR, and man-in-the-loop play
  - Variable input/output by friendly and opposing force component

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SUMMARY OF RESULTS (CONTINUED)

New functionality

Which operations to be modeled and simulated was considered separately from data, data handling, and environment modeling. The general findings of the ETMO workshop was that the M&S functionality needs to be extended to meet ETMO requirements. The needed functionality includes social, economic, and political models to support commanders in the evaluation of alternative command decisions. While combat simulations do exist, they should be expanded to cover the complete spectrum of military operations from intense combat to non-combat operations such as nation building and disaster relief. As part of the M&S of military operations, mobilization, deployment, and redeployment of military forces and assets should be added to the functionality of M&S.

In addition to widening the scope of military operations models, the complexity, or fidelity, of the models and simulations should also be improved. Intelligence models, and specifically predictive intelligence models, should be integrated into M&S. The M&S should not be limited to simple two-sided interactions. Coalition forces can have national goals and objectives that are only partially in accordance with U.S. goals, objectives, and strategies. Forces can change from hostile to neutral to allied during a campaign. These complexities need to be accounted for and represented in M&S.

Behavioral representation

Behavioral representation within M&S is required to extend the utility of M&S. Man-in-loop play is always limited by the labor requirements of including sufficient players to provide useful training and education. Behavioral representation allows the model or simulation to represent the behavior of players that are not available for the current exercise or training session.

Representation of specified threats (playing against the computer) includes threat representation that responds to Blue actions, within the doctrinal, training, and equipment constraints of the threat force. Representation of non-adaptive Blue force behavior would automate the execution of force or unit orders. Automated decision makers and staff support functions are required to extend the perceived scope of training and exercises both laterally to more units and vertically to represent support, staffs, and agencies not physically included.

M&S users should have selectable level of behavioral representation. If the players are available, then man-in-loop should be used. If few players are available, then semi-automated forces (SAFOR), guided by a limited number of players, should be an available option. Or, the M&S user may simply choose intelligent forces (IFOR) due to the lack of available players.

In addition to selecting the level of representation, it should be possible to select the amount and detail of both input and output data by force component.

SUMMARY OF RESULTS
(CONTINUED)

- Security
  - Selectable transparency
  - Multi-level-security

- Infrastructure
  - Easy access to information, data, and models
  - Simulation as a secondary specialty
  - Professional military education

- Attributes
  - Event stepped
  - Multiple scenarios played
  - Monitorable
  - Interoperable
  - Re-baseline
  - Variable simulation speed selection
  - etc.

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SUMMARY OF RESULTS (CONTINUED)

Security

Security is a recurring issue with the integration of multiple players accessing multiple data bases that represent real world situations and problems. Not only must data be transferred to realize M&S possibilities, but the security of that data must be maintained to avoid compromising operational and national security.

In order to achieve M&S applications to ETMO, an approved means must be established to control access to classified information. The users of M&S must have a level of classification selected and enforced for each user. For large integration of models and simulations, this implies multiple levels of security, not simply declaring the security level to the level of the lowest user.

Infrastructure

A M&S infrastructure needs to be developed to ensure easy affordable access to information, data, and models. M&S should be established as a secondary military specialty and included in professional military education.

Attributes

All working groups identified event-stepped models as the preferred mode to allow the greatest flexibility in model time versus user time. Three working groups repeated a desire to be able to speed up or slow down events through event-stepped models.

Two or more geographically separate military operations running concurrently are required to evaluate force employment options.

The M&S user should be able to monitor user selected data within the model or simulation. He should be able to interrupt the model or simulation during execution. And the user should be able to quickly and easily modify the model or simulation input data to establish a new baseline.

SUMMARY RESULTS
(CONTINUED)

- **Unique Workgroup Perspectives**

  - **M&S support of Military Planning and Rehearsal**
    - -- Real world data into M&S
    - -- Mission analysis, planning, and rehearsal
    - -- Inclusion of coalition forces

  - **M&S support of Joint Training**
    - -- Exercise data into M&S
    - -- Exercise control and evaluation

  - **M&S support of Service Interoperability**

  - **M&S support of Military Education**
    - -- Limited resources to support student use of M&S
    - -- Emphasis on decision process, not decision results
    - -- Extend range of M&S
      - --- Management of force structure
      - --- Acquisition

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SUMMARY OF RESULTS (CONTINUED)

Unique perspectives

Although there were many primary needs identified of a common nature among the working groups, there are also unique perspectives of each group's area regarding the use of models and simulations. Listed below are the important differences which were brought out.

Military Planning and Rehearsal

M&S support to operations emphasizes the use of high quality real-world data. Mission planners and operators want to simulate the mission and evaluate mission alternatives with the most current and best-possible quality data. A second major concern for planning and rehearsal is to include coalition force actions according to expected doctrine of coalition forces.

Joint Training

Use of M&S to support and enhance exercises requires real-world data be selectively replaced with exercise data. Also in addition to evaluating simply how well a mission may go, *the exercise controller needs to be able to use the netted M&S environment to monitor, control, and evaluate the exercise.*

Service Interoperability

The use of M&S in support of training is essentially the same as that for joint exercises. Additional use of behavioral representation may or may not be used to represent other component operations.

Military Education

Military education is severely resource constrained by the nature of the education process. Military operations and training can command relatively large M&S resources, whereas education is time and support resource constrained. Students using M&S cannot expect to be supported with large education-dedicated M&S infrastructures. Instead, M&S that can be operated without support (e.g., that fit on a PC) are preferred.

APPENDIX A

CONSOLIDATED RESULTS OF ETMO WORKSHOP

Appendix A

CONSOLIDATED RESULTS
OF
ETMO WORKSHOP

M&S INTEGRATION

- Live and simulation interactions (imbedded simulation, i.e., simulations interacting with live systems)

- Distributed, interoperable, open system architecture with object level orientation (Standards, COTS, & GOTS)

- M&S data should evolve from real world sources with interfaces to C4I

  - Seamless integration of C4I into M&S
  - Able to overlay simulation on real world and/or FTX events
  - Able to seamlessly integrate intelligence models into future development

- Need simulation to overlay more complicated problem play on theater (to alleviate restrictions of host nation treaties)

- Models must be able to augment the field training environment

- Need interconnectivity among CINC models and other users

- M&S accessible for planning, analysis, training, testing, rehearsal & fighting on compatible systems

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DATABASE

- **Geographic capability: notionally global throughout the world**

- **Common, easily reusable, reconfigurable/adjustable databases (e.g., civilian, logistics, threat, force characteristics)**

  - **Threat database**
    - -- **Training-based effectiveness**
    - -- **Weapons systems & platform types**
    - -- **Size/quantity**
    - -- **Threat doctrine represented (SAFOR)**
    - -- **Sustainability**

  - **Blue database (similar to threat data)**
    - -- **Full array of sensors**

  - **Civilian databases**
    - -- **Levels of hostility**
    - -- **Refugee flow**

- **Easy input**

- **M&S able to use representative vs. real-world data**

DATABASE (CONTINUED)

- Need automated development of force laydown databases and scenarios

- Need new models that can reflect present and changing world situations

- Archival, retrievable databases with configuration management and traceability

- Man-machine interface should both support data handling and be simple to use

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COMMON TOOLS

- **Exercise Director Management Aids needed**

  - Control of M&S
    -- Interrupt
    -- Playback
    -- Tempo variation

  - Selectable data capture & analysis to support reporting, (e.g., after-action reports)

  - "Magic carpet" observation of the exercise

  - Appropriate control of the reconstitution of players

  - Embedded training feedback and evaluation tools of decisions

- Graphic insertion/user graphics

- Need automated development of databases and scenarios

- Need to reduce M&S resource requirements (personnel time, dollars, and equipment)

- M&S should be able to use real world data and have easy input

ENVIRONMENTAL REPRESENTATION

- **Environmental databases**

  - **Weather changes (including temperature)**
  - **Light conditions**
  - **Terrain (including dynamic changes)**
  - **Sea (shallow & thermal conditions)**
  - **Highly detailed cultural features**
  - **Space represented**
  - **Electronic combat/electronic warfare**
  - **Thermal**

- **Environmental effects on sensors and systems**

- **Standard environmental algorithms and models**

- **Need to support interoperable simulation**

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NEW FUNCTIONALITY

- Integrate force mobilization & deployment M&S into other joint combat simulations

- Need M&S capability and speed that will allow the play from pre-conflict to post-conflict

- Need to develop M&S that reflects current and changing world situations

- Need to include social, economical, & political models

- M&S to address spectrum of conflict for all regions of the world (weak & strong)

- Need predictive intelligence modeling capability: production, movement, conversion of commodities

- Need M&S to replicate full spectrum of mobilization & deployment process

- Need M&S to support Joint mission rehearsal

NEW FUNCTIONALITY (CONTINUED)

- Need to seamlessly integrate existing intelligence models into future development

- Simulation of other staff, support, or agency functions

- Seamless integration of C4I models

- Need non-combat scenario development
  - Natural disaster scenario development
  - Need counter-drug models

- Need models that play more than two-sided force-on-force interactions

NEW FUNCTIONALITY (CONCLUDED)

- M&S needs to provide realistic effectiveness degradation

  - **Bomb damage assessment**
  - **Logistics**
    - -- **Cargo & transport dimensions, weight & handling**
    - -- **Realistic consumption rates & resupply play**
    - -- **HAZMAT models available**
  - **IFF capabilities**
  - **Simulate communication nets**
  - **Deception play options**
  - **Fog of war played**

- Incorporation of national intelligence assets into M&S

A-9

BEHAVIORAL REPRESENTATION

- Behavioral representation in threat specific models and non-adaptive behaviors for blue (critical tasks)

- Select from IFOR*, SAFOR** & Man-in-Loop play

- Variable input/output by component of friendly and opposing forces

- Selectable levels of aggregation

- Simulation of other staff, support, or agency functions

- Include "fog-of-war" effects

* IFOR - Intelligent Forces
** SAFOR - Semi-Automated Forces

A-10

SECURITY

- Selectable transparency

- Multi-level security

INFRASTRUCTURE

- Well-defined infrastructure with easy access to data models & other information

- Simulation secondary specialty

- Coordinate/maintain common databases

- Professional military education to include M&S

ATTRIBUTES

- Affordability of full time DSI to users is an issue

- Need to represent entire campaigns (pre-conflict through post-conflict including mobilization, deployment, and redeployment)

- Single model capable of multiple (at least two) theater conflicts

- Selectable levels of aggregation

- Man-machine interface: non-expert standard interface

- Reaction time supportive of OPTEMPO

- Event stepped

- Speed: slower than real time to 30 days in an hour

- Monitorable

- Interruptable

- Ability to re-baseline

- Simultaneous multiple scenarios played

- Provide game truth, blue perspective, red perspective

- Modular, expert systems (with learning ability)

- Briefing (or other) compatible post processor of M&S data

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APPENDIX B

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B-2

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APPENDIX C

DESIRED M&S CHARACTERISTICS

JOINT TRAINING WORKING GROUP

DESIRED
M&S CHARACTERISTICS
DERIVED FROM METLs

C-1

BASELINE M&S Characteristics

- **Need embedded training feedback and evaluation tools to evaluate staff decisions.**
- **Resident tools are preferred to shared tools**
- **Need interconnectivity among CINC models and other users**
- **Need to interface seamless C4I with other simulations**
- **Simulations should be able to use real world data and have easy input**
- **Need automated development of data bases and scenarios**
- **User should have low sense of awareness that he/she is using a model (transparency issue)**

C-2

METLs

- Mobilize/Deploy/Provide Forces (incl. SO/LIC)
- Receive/Employ Forces
- Conduct Contingency Operations
- Provide Crisis Response
- Maintain Forward Presence/Deter
- Conduct Peacetime Stability Operations
- Provide for the Command and Control of Forces (C4I)
- Provide for the Sustainment of Forces
- Support Counter-Drug Operations
- Conduct Nuclear Operations

C-3

MOBILIZE/DEPLOY/PROVIDE FORCES

- Manage readiness of deploying units
- Secure/monitor operational capability of mob bases, sites and routes to ports
- Process forces through mob stations
- Plan and conduct deployment operations
- Protect LOCs

C-4

METL #1 - Environment
MOBILIZE/DEPLOY/PROVIDE FORCES

Training Audience:
- NCA to component level, Service agencies

Environment:
- CPX & seminar (CAX)
- Wargaming
- FTX

Training Objectives:
- assist senior level planners in allocation of resources, deployment of forces

Scenario events:
- Competition for resources, from mobilization perspective
- Blue- senior staff involved, supporting CINCs, JTF commanders
    - LOC operators
- Red- opposing forces, validated threat, threat analysis

Geography:
- world-wide, real world

C-5

METL #1 - Limitations
MOBILIZE/DEPLOY/PROVIDE FORCES

- Can't do force tracking as well as we'd like in real world
- In exercise world, we can't do it because don't have access to real world systems.
- Can't do force list generation
- Can't do complete TPFDDs
- Can't evaluate TPFDD effectiveness
- We have nothing that replicates the mobilization process
- We don't have the time and other resources to replicate mob process sufficient to exercise and evaluate the training audience. The scope of the exercise to task cannot be compressed into the exercise time available.
- Can't afford to do an exercise in terms of that scope.
- Takes special folks a long time to convert or build data bases to input into JOPES.

C-4

METL #1 - M&S Characteristics
MOBILIZE/DEPLOY/PROVIDE FORCES

- **Integrate mob & deployment models into other joint combat simulations**
- **Need models to replicate full spectrum of mobilization & deployment process**

C-7

RECEIVE/EMPLOY FORCES

- **Plan and conduct joint operations**
- **Provide for reception and onward movement**
- **Intelligence, targeting, C4I**
- **Combined/joint training**
- **POL/MIL**
- **Special purpose operations (include PSYOPs)**

C-8

METL #2 - Environment
RECEIVE/EMPLOY FORCES

Audience:
- primary audience is supporting CINCs (JTF focus)
- in-theater operating force

Training Objectives:
- translation of strategic guidance to operational objectives, and then execution
- see above supporting tasks

Scenario events:
- focus on major regional contingencies (MRCs) and LRCs
- Blue participation - CPX, CPX w/ small FTX portion, etc.)

Geography:
- Anywhere, real world replication, WX

Time:
- 1 to 1 or greater

METL #2 - Limitations
RECEIVE/EMPLOY FORCES

- Can't represent the dimension of the interoperability problems we have among the Services
- Can't represent the problems of reconstructing the unit as it comes out of the pipeline.
- Unable to fully receive and employ the resources available
- Not permitted to fully utilize the intelligence capabilities for production, fusion, and dissemination of intelligence data.
- Given existing exercise tools, can't tailor the HQ or staff element player set.
- Any conflict other than two-sided, force-on-force we don't do very well.
- We don't do a good job w/ post-conflict termination environments
- Can't represent contribution of non-fighting resources (e.g., PSYOP, SOF, combat multipliers.)
- We don't do good job of overlaying simulated environments on real world

METL #2 - M&S Characteristics
RECEIVE/EMPLOY FORCES

...
- **Need better plan and support tools. May not need simulation to solve certain of these problems.**
- **Need to be able to overlay simulation on real world**
- **Need speeds of models that will allow the play from pre-conflict to post-conflict**
- **Need to seamlessly integrate existing intelligence models into future development**
- Simulation of other staff, support, or agency functions

C-11

CONDUCT CONTINGENCY OPERATIONS

- **Coordinate POL/MIL**
- **Prepare and evaluate OPLANS & CONPLANS**
- **IPB (Intelligence Preparation of the Battlefield)**
- **Execute OPLANS & CONPLANS**
  (e.g., contingencies)

C-12

METL #3 - Environment
CONDUCT CONTINGENCY OPERATIONS

Training audience:
- JTF and higher
- Emphasis on JTF and its Service components

Scenario events to support training objectives:
- MRC, LRC
- no plan environment

Blue participation:
- higher, lower, adjacent (replication of)

Red participation:
- threat analysis

Geography:
- same as before

Training objectives:
- METLs & supporting tasks

Time:
- One to one or greater
- may want to slow down to teach new guys (applies across the board)
- from crisis start to favorable termination
- time bridging

C-13

METL #3 - Limitations
CONDUCT CONTINGENCY OPERATIONS

- Not permitted to fully utilize the intelligence capabilities for production, fusion, and dissemination of intelligence data.
- Translation from OPLAN to exercise scenario is difficult and expensive.
- Can't exercise sensitive OPLANs

METL #3 - M&S Characteristics
CONDUCT CONTINGENCY OPERATIONS

> - **Seamless integration of C4I models**

C-15

PROVIDE CRISIS RESPONSE

- **Prepare plans & orders**
  (conduct crisis action planning and procedures)
- **Prepare crisis actions teams**
- **Prepare JTF HQ**
- **Prepare ready response forces**

C-16

METL #4 - Environment
PROVIDE CRISIS RESPONSE

- see METL #1-3
- subset of contingency operations
- execution may begin before or simultaneous with planning function

C-17

METL #4 - Limitations
PROVIDE CRISIS RESPONSE

- At CINC level, we don't exercise our ability to interface with other players (don't do POL/MIL)
- We have difficulty merging training events with operational activities

C-18

METL #4 - M&S Characteristics
PROVIDE CRISIS RESPONSE

- **Need models that run slower and faster than real time to facilitate training**
- **Need to develop POL/MIL models (economic, social, political, situational)**

C-19

MAINTAIN FORWARD PRESENCE/DETER

- Conduct freedom of access operations
- Conduct demos and show of force
- Maritime interdiction operations (MIO)
- Conduct port visits
- Combined exercises
- Disseminate selected intelligence
- POL/MIL

C-20

METL # 5 - Environment
MAINTAIN FORWARD PRESENCE/DETER

Training objectives:
- build CINC strategy

Training audience:
- The CINC himself and staff
- JTF and higher
- "Regional working groups"

Scenario:
- architecture to enhance component participation and training value
- real world POL/MIL

Blue participation:
- troop participation

Red participation:
- treaty obligations, other real world considerations

Geography:
- real world AOR

Time:
- real time

C-21

METL #5 - Limitations
MAINTAIN FORWARD PRESENCE/DETER

- Not easy to represent POL/MIL environment
- Difficult to derive adequate training benefit from required exercises
- Not permitted to fully utilize the intelligence capabilities for production, fusion, and dissemination of intelligence data.
- Traditional exercise environment does not lend itself to accomplishing forward presence missions
- Treaty obligations place constraints on training

C-22

METL #5 - M&S Characteristics
MAINTAIN FORWARD PRESENCE/DETER

- **Need simulation to overlay more complicated problem play on theater (to alleviate restrictions of host nation treaties)**
- **Need to overlay simulations on FTX events**
- **Models must be able to augment the field training environment**

C-23

CONDUCT PEACETIME
STABILITY OPERATIONS

- **Peacetime internal defense/development**
- **Nation-building operations**
- **Humanitarian relief**
- **POL/MIL**
- **Assist in civil disturbances**

C-24

METL #6 - Environment
CONDUCT PEACETIME STABILITY OPERATIONS

> **Training Audience:**
> - CINC & his staff (policy development - bullets 1,2,4)
> - JTF & higher (action - bullet #3)
> - multi-disciplinary group
> - host nation
> - component forces with related tasks
>
> **Training objectives:**
> - METLs & supporting tasks

C-25

METL #6 - Limitations
CONDUCT PEACETIME STABILITY OPERATIONS

> - We don't have an exercise medium for training non-traditional tasks like humanitarian relief
> - Lack of integration between DoD and other agencies
> - Competition for resource allocation with other training requirements
> - Lack of coordination of similar tasks between CINCs and civil agencies

C-26

METL #6 - M&S Characteristics
CONDUCT PEACETIME STABILITY OPERATIONS

- Need natural disaster scenario development
- Need non-combat scenario development

C-27

PROVIDE FOR THE COMMAND AND CONTROL OF FORCES (C4I)

- Integrate use of strategic and tactical C4I systems
- Intelligence production, fusion, dissemination
- Communication coordination
- COMSEC
- OPSEC
- JFACC (Joint Force Air Component Commander)
- Organize/man/equip joint force HQ element

C-28

METL #7 - Environment
PROVIDE FOR THE COMMAND AND
CONTROL OF FORCES (C4I)

Training Audience:
- JTF up to NCA
- CINC staff + building elements of JTF headquarters

Scenario events:
- spectrum of conflict, crisis through deliberate

Blue participation:
- higher, lower, adjacent
- SPACECOM participation

Geography:
- space (if space is involved)

C-29

METL # 7 - Limitations
PROVIDE FOR THE COMMAND AND
CONTROL OF FORCES (C4I)

- Can't replicate the dimension of the hardware interoperability problems
- Can't fully stress the system in an exercise environment
- Redundant communications are required to support simulation-driven exercise structure
- Security classification problems on exercise networks
- In FTX environment, competition for real-world C4I resources
- Training equipment is not equivalent to real-world equipment

C-30

METL #7 - M&S Characteristics
PROVIDE FOR THE COMMAND AND CONTROL OF FORCES (C4I)

- **All baseline requirements apply**

C-31

PROVIDE FOR THE SUSTAINMENT OF FORCES

- Maintain strategic sealift and airlift capability
- Integrate host nation support
- Mobilize/prepare follow-on forces
- Assess industrial base capabilities
- Force tracking (assess force following)
- Provide logistics support (CE, personnel, medical, etc.)

C-32

METL # 8 - Environment
PROVIDE FOR THE SUSTAINMENT
OF FORCES

Training audience:
- JTF to NCA level, and other government agencies

Blue participation
- Host nation participants (or simulated)
- Government agencies
- Industrial Base

C-33

METL #8 - Limitations
PROVIDE FOR THE SUSTAINMENT
OF FORCES

- Similar limitations to METL #1
- Can't fully stress system
- Can't replicate sustainment, given constraints (e.g., host nation)

C-34

METL #8 - M&S Characteristics
PROVIDE FOR THE SUSTAINMENT
OF FORCES

- **Need to represent entire campaigns (pre-conflict through post-conflict).**

C-35

SUPPORT COUNTER-DRUG OPERATIONS

- **Detect illegal drug flow**
- **Monitor illegal drug flow**
- **Coordinate counter-drug activities with law enforcement agencies, host nations and other CINCs**

C-36

METL #9 - Environment
SUPPORT COUNTER-DRUG OPERATIONS

Training audience:

- JTF , CINCs, other government and LEAs
- Host nation

Training objectives:

- METL and supporting tasks

Red participation:

- Intelligence community experts (CIA, role players who can replicate narco-trafficking organization/operations)

Geography:

- Specific locations can be identified, smaller in scope from global ops.
- Real terrain, comparable to AOR

C-37

METL # 9 - Limitations
SUPPORT COUNTER-DRUG OPERATIONS

- Can't replicate complexities of real world
- Difficult to characterize real world
- Difficult to develop a pro-active training program for counter-drug
- Difficult to integrate with LEAs/host countries
- No POL/MIL models
- Difficult to quantify POL/MIL economic impact

C-38

METL #9 - M&S Characteristics
SUPPORT COUNTER-DRUG OPERATIONS

- Need counter-drug models
- Models need strong analytical capability to assist CINC in resource or military capabilities allocation
- Need models that play more than two-sided force-on-force interactions
- Need predictive intelligence modeling capability - production, movement, conversion of commodities

C-39

CONDUCT NUCLEAR OPERATIONS

- Collect intelligence
- Initial tactical warning and assessment
- Detection
- Continuity of operations
- Continental airborne recce and damage assessment
- Residual capabilities assessment
- Reconstitution
- SIOP (STRATCOM)

C-40

METL #10 - Environment
CONDUCT NUCLEAR OPERATIONS

Training Audience:
- JTF to NCA

Geographical:
- space requirements

C-41

METL # 10 - Limitations
CONDUCT NUCLEAR OPERATIONS

- Geopolitical sensitivities inhibit nuclear operational training
- Unable to develop usable scenarios (realistic scenarios are politically taboo)
- Can't integrate training between the different levels from CINC to NCA.
- Cannot effectively train defense against nuclear attack
- Cannot examine new doctrine short of fully implementing it

C-42

METL #10 - M&S Characteristics
CONDUCT NUCLEAR OPERATIONS

- Need to develop new models that can reflect present and changing world situations
- Model needs to develop scenarios that are politically non-sensitive

C-43

M&S CHARACTERISTICS

- Integrate mob & deployment models into other joint combat simulations
- Need models to replicate full spectrum of mobilization & deployment process
- Need better plan and support tools. May not need simulation to solve certain of these problems.
- Need to be able to overlay simulation on real world and/or FTX events
- Need speeds of models that will allow the play from pre-conflict to post-conflict
- Need to seamlessly integrate existing intelligence models into future development
- Simulation of other staff, support, or agency functions
- Seamless integration of C4I models
- Need models that run slower and faster than real time to facilitate training
- Need to develop POL/MIL models (economic, social, political, situational)

C-44

M&S CHARACTERISTICS (CONT'D)

- **Need simulation to overlay more complicated problem play on theater (to alleviate restrictions of host nation treaties)**
- **Models must be able to augment the field training environment**
- **Need natural disaster scenario development**
- **Need non-combat scenario development**
- **Need to represent entire campaigns (pre-conflict through post-conflict).**
- **Need counter-drug models**
- **Models need strong analytical capability to assist CINC in resource or military capabilities allocation**
- **Need models that play more than two-sided force-on- force interactions**
- **Need predictive intelligence modeling capability - production, movement, conversion of commodities**
- **Need to develop new models that can reflect present and changing world situations**
- **Model needs to develop scenarios that are politically non-sensitive**

APPENDIX D

DESIRED M&S CHARACTERISTICS

SERVICE INTEROPERABILITY WORKING GROUP

DESIRED
M&S CHARACTERISTICS
DERIVED FROM METLs

D-1

MISSION ESSENTIAL TASK LIST

Coalition Warfare is an overriding consideration which must be included in all training.

D-2

MISSION ESSENTIAL TASK LIST

° **Air Operations**

° **Amphibious Operations**

° **Operations**

° **Coordinated Weapons Delivery**

° **Civil/Military Operations**

° **Rear Area Operations**

° **Intelligence**

° **Blockade**

° **Logistics**

TRAINING ENVIRONMENT
BLOCKADE/SIEGE

Supporting Tasks

° Mine Warfare

° Air Space Control/No Fly Zones

° Stop and Search

° Escort

° Detection and Monitoring

Training Objectives

Given an ordered blockade the JTF Staff will:

1. Determine resources required

2. Select vehicles to accomplish mission

3. Plan the integrated operations

4. Initiate the blockade

5. Maintain the blockade

6. Terminate the blockade

TRAINING ENVIRONMENT
BLOCKADE/SEIZE (Conc'd)

Training Audience
  JTF Staff
Scenario events to support training objectives
  Crisis Initiated
  Belligerent response-variable
  Dedicated Red player-variable
Blue participation
  JTF Staff
  Response Cells
Red participation
  Response Cells
Geography
  Variable
Time
  Crisis start
  Variable speed (event/decision stepped)

D-5

TRAINING ENVIRONMENT
OPERATIONS

Supporting Tasks
  See scenario
Training Objectives
  Given cross attached forces:
  1. Plan
  2. Rehearse
  3. Execute
  4. Assess
Training Audience
  JTF Staff
  Battalion and above Staff

D-6

TRAINING ENVIRONMENT
OPERATIONS (Cont'd)

Scenario events to support training objectives
- **Platform to JTF level**
- **Specific mission and generic scenario**
- **Search and Rescue**
- **EW**
- **Maneuver Coordination**
- **contingency Planning**
- **Communications**
- **Deception**
- **Tactical Differences (Ground)**
- **Fratricide**

Blue participation
- **JTF Staff**
- **Unit Staffs of all services**

TRAINING ENVIRONMENT
OPERATIONS (Conc'd)

Red participation
- **Multi-echelon**
- **Ground, air, and sea**

Geography
- **Variable**

Time
- **Variable tempo**
- **Interruptible**
- **Division and above: 2 weeks+ duration**
- **Brigade and below: 1 week- duration**

TRAINING ENVIRONMENT
REAR AREA OPERATIONS

Supporting Tasks
  See scenario
Training Objectives
  Given responsibility for Rear Area Security:
  1. Jointly plan
    A. Areas of responsibility
    B. Forces
    C. Reactions
    D. Rules of engagement
Training Audience
  Air Force/Navy Installation Commander
  Army Division+ Staffs

D-9

TRAINING ENVIRONMENT
REAR AREA OPERATIONS (Cont'd)

Scenario events to support training objectives
  Crisis initiated (sometimes)
  Installation Security
  Counter-Intelligence
  POW
  Refugees
Blue participation
  Air Force/Navy Installation Commander
  Army Division+ Staffs
  Battalion and below maneuver units
  Military/Air/Shore Police Units
  Counter-Intelligence Units
  Civilians
  Indigenous Military Units

D-10

TRAINING ENVIRONMENT
REAR AREA OPERATIONS (Conc'd)

Red participation
   Emphasis on Light Forces
   Neutrals
   POWs
Geography
   Selected cultural features
   City or smaller
Time
   Variable tempo
   Duration: 2 days-

TRAINING ENVIRONMENT
CIVIL/MILITARY OPERATIONS

Supporting Tasks
   See scenario
Training Objectives
   Establish Liaison Teams
   Provide humanitarian relief
   Negotiate agreements
   Establish and maintain civilian infrastructure
Training Audience
   Naval Base Commander
   Installation Commander
   Battalion and Higher Commander and Staff
   Civil affairs Units
   Battle Group Commander

TRAINING ENVIRONMENT
CIVIL/MILITARY OPERATIONS (Cont'd)

Scenario events to support training objectives
- Provide humanitarian relief
- Counter Drugs
- Law Enforcement
- Disaster Response
- Civil Affairs
- Political Considerations
- Unique database needs

Blue participation
- Foreign governments
- Navy and Air Force Support Groups
- Army and USMC-all type units, battalion and above
- Army Civil Affairs
- Air/Sea Lift
- Law Enforcement Agencies

TRAINING ENVIRONMENT
CIVIL/MILITARY OPERATIONS (Conc'd)

Red participation
- Drug Cartels
- Terrorist organizations
- Non-cooperating governments
- Hostile civilian groups

Geography
- Variable

Time
- Highly variable: 2 days to several months

TRAINING ENVIRONMENT
COORDINATED WEAPONS DELIVERY

Supporting Tasks
   See scenario
Training Objectives
   Given a target set:
   1. Collect target data
   2. Coordinate efficient servicing of target
   3. Issue fire mission or order
   4. IFF
   5. Collect BDA
   6. Re-attack
   7. Minimize collateral damage

TRAINING ENVIRONMENT
COORDINATED WEAPONS DELIVERY (Cont'd)
Training Audience
   Commander Task Force
   Battle Group Commander
   Commander Landing Force
   TACP through platforms
Scenario events to support training objectives
   Limited precision strikes to major conflict
   Low intensity to high intensity
   Munitions constraints
   Targeting
   UAV
   IFF
   Fire Support Coordination
Blue participation
   Same as training audience
   Supported units

TRAINING ENVIRONMENT
COORDINATED WEAPONS DELIVERY (Conc'd)

Red participation
- Enemy air defences
- Target set
- Neutral forces and civilians

Geography
- Variable

Time
- Real and variable time

TRAINING ENVIRONMENT
AIR OPERATIONS

Supporting Tasks
- See scenario

Training Objectives
- Given multi-service delivery capabilities, with respect to an ATO:
  1. Production
  2. Dissemination
  3. Execution
  - ACO Coordination

Training Audience
- Platform to JTF and JFACC

TRAINING ENVIRONMENT
AIR OPERATIONS (Cont'd)

Scenario events to support training objectives
- Anti-air/ADA/Counter-air
- Escort
- Airspace Control
- TBMD
- ATO Production and Dissemination
- Tactical Differences
- IFF
- Coordinated strike subtasks
- National systems included
- Programmed/guided missiles

Blue participation
- Air platforms
- Ship/ground anti-air
- Ground units

D-19

TRAINING ENVIRONMENT
AIR OPERATIONS (Conc'd)

Red participation
- Target sets
- Neutrals
- Red Ground forces
- Air/naval forces
- Anti-air
- ECM

Geography

Time
- Real or accelerated time

D-20

TRAINING ENVIRONMENT
AMPHIBIOUS OPERATIONS

Supporting Tasks

   See Scenario

Training Objectives

   Given an amphibious mission:

   1. Plan

   2. Embark

   3. Rehearsal

   4. Movement

   5. Assault

Training Audience

   Commander Landing Force

   Commander Air Task Force

   Army Brigade and above

   USMC-MEU+

D-21

TRAINING ENVIRONMENT
AMPHIBIOUS OPERATIONS (Cont'd)

Scenario events to support training objectives

   Maneuver Coordination

   River Operations

   Mine Warfare

   Air Support/Coordination

   SOF Operations

   Fire Support

   IFF

   Embark/Debark

   Amphibious terrain

Blue participation

   Training audience

   Ships

   Air Force

   Mine Clearing

   UDT

D-22

TRAINING ENVIRONMENT
AMPHIBIOUS OPERATIONS (Conc'd)

Red participation
    Enemy defences
    Anti-ship
    Anti-air
    Mines
Time
    Planning-variable
    Remainder of objectives-less than 2 weeks
    Variable tempo

TRAINING ENVIRONMENT
INTELLIGENCE

Supporting Tasks
    See scenario
Training Objectives
    Given intelligence sources available:
    1. Planning
    2. Collection
    3. Fusion
    4. Dissemination
Training Audience
    All staffs

TRAINING ENVIRONMENT
INTELLIGENCE (Cont'd)

Scenario events to support training objectives
- Full variety of intelligence products
- Peacetime to high intensity
- Global situations and forces involved
- Full range of Red equipment (to include Blue systems)
- Targeting
- Surveillance
- UAV
- EW
- Indications and Warnings
- Political

TRAINING ENVIRONMENT
INTELLIGENCE (Conc'd)

Blue participation
- All intelligence sources (national, compartmented, allied)
- Training audience
- DIA
- NSA
- DEA
- FBI

Red participation
- Appropriate forces for level played

Geography
- Highly Variable

Time
- Variable tempo and variable duration

TRAINING ENVIRONMENT
LOGISTICS

Supporting Tasks
- Port Operations
- Airfield Operations
- Resupply
- Hazardous Materials
- Weapons handling
- Embark/debark

Training Objectives

Given need to move supplies:
1. Conduct Port operations
2. Conduct Airport Operations
3. Handle HAZMAT
4. Load and move weapons

TRAINING ENVIRONMENT
LOGISTICS (Cont'd)

Training Audience
- JTF Staff
- TACC
- ALCE
- Allied Port Units
- Army Airfield Units (ATCP)
- Navy CHAPS
- Army Port Units
- MARDE2

Scenario events to support training objectives
- Political
- Unpredictable changes in platforms and demands
- Peacetime to high intensity
- Security constraints (deception options)
- Losses and damage
- Multiple, simultaneous missions

TRAINING ENVIRONMENT
LOGISTICS (Conc'd)

Blue participation
- Training audience
- Transport platform
- Civilians (labor)

Red participation
- Sabotage
- Normal operations

Geography
- Global (discontinuous)

Time
- Variable tempo (usually not real time)
- Duration: 2 weeks to continuous

D-29

M&S CHARACTERISTICS

Scenario Generation
- Automated scenario generation
- Selectable catalog of full & skeleton scenarios
- Simultaneous multiple scenarios played
- Data Bases
  - Reconfigurable/adjustable Threat DB
    - Training-based effectiveness
    - Weapons systems & platform types
    - Size/quantity
    - Doctrine differences represented (SAFOR)
    - Sustainability
  - Blue DB (similar to Threat data)
    - Full array of sensors
  - Civilian DB
    - Levels of hostility
    - Refugee flow

D-30

M&S CHARACTERISTICS

Scenario Generation (continued)
- Data Bases (continued)
    - Environmental DB
        - Weather changes (including temp)
        - Light conditions
        - Terrain (including dynamic changes)
        - Sea (shallow & thermal conditions)
        - Highly detailed cultural features
        - Space represented
    - Pol/Econ/Social considerations
    - Variable levels of warfare intensity
Dynamic Changes in Process
    - Replay, interrupt, edit, vary tempo
    - Appropriate reconstitution of players
    - Event stepped and changes in intensity
Realistic effectiveness degradation from play effects
BDA

M&S CHARACTERISTICS

AAR Support
- Playback, selectable data capture & analysis
- Magic carpet capability
- Graphical user interface
- Immediate or rapid availability
- Selectable transparency
IFF Capabilities
Simulate Comm Nets
Select from IFOR, SAFOR & Man-in-Loop play
Selectable Levels of Aggregation
Deception Play Options
Fog of War Played
National Intel Assets Incorporated
Multi-level Security
Exercise Director Management Aids needed

M&S CHARACTERISTICS

Logistics
- Cargo & transport dimensions, weight & handling
- Realistic consumption rates & resupply play
- HAZMAT models available

Live and Simulation Interactions (Imbedded Sim)
- Interactive simulation with live systems

Interactive computerized courseware

SIMCOM
- Simulation secondary specialty
- Coordinate/maintain common databases
- Joint (e.g. NDU)

APPENDIX E

DESIRED M&S CHARACTERISTICS

EDUCATION WORKING GROUP

DESIRED
M&S CHARACTERISTICS
DERIVED FROM METLs

E-1

MILITARY EDUCATION FRAMEWORK

E-2

MILITARY EDUCATION CONTINUUM

Professional
Military
Education
(PME)

Continuing
Professional
Education

Program for
Joint Ed
Phase I

Joint PME

Graduate
Education

Program for
Joint Ed
Phase II

Professional
Continuing
Ecuation

E-3
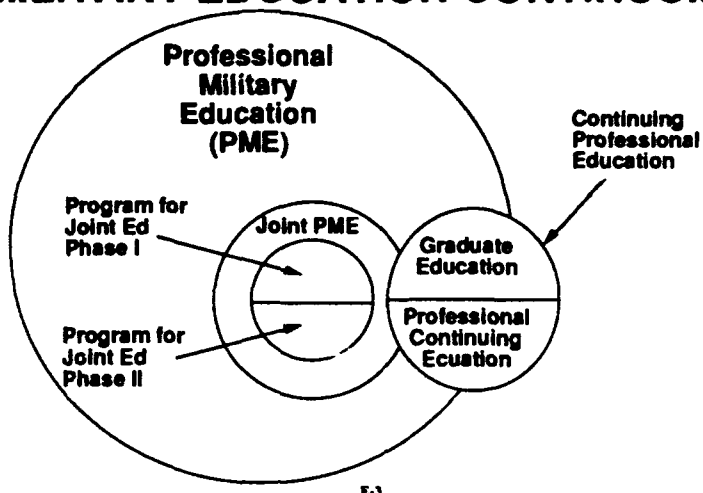
JOINT MISSION ESSENTIAL TASK LIST
FOR EDUCATION

- Conduct Service Specific Professional Military Education

- Conduct Joint Professional Military Education

- Conduct Continuing Professional Education

E-4

ETMO M&S REQUIREMENTS WORKSHOP
EDUCATION WG

SERVICE SPECIFIC PROFESSIONAL MILITARY EDUCATION
Supporting Tasks

- Leadership
- Educate on implementing quality
- Educate on managing change
- Employment of Service forces in support of theater objectives
- Apportionment, allocation, and allotment of Service forces
- Service doctrine, tactics, techniques, and procedures

E-5

ETMO M&S REQUIREMENTS WORKSHOP
EDUCATION WG

SERVICE SPECIFIC PROFESSIONAL MILITARY EDUCATION
Supporting Tasks cont'd

- C2
- Roles, missions, values, and history
- Systems
- Resource allocation (PPBS)
- Logistics and industrial base
- Staff skills

E-6

ETMO M&S REQUIREMENTS WORKSHOP
EDUCATION WG

JOINT PROFESSIONAL MILITARY EDUCATION (JPME)
Supporting Tasks

- Joint history, purpose, and overview
- Joint organization, missions, and inter-Service relationships
- Joint / combined forces in the operational and theater level war
- Service organization and command relationships
- Joint C4I
- Defense planning systems
- National military capabilities and command structure
- Joint doctrine

E-7

ETMO M&S REQUIREMENTS WORKSHOP
EDUCATION WG

JOINT PROFESSIONAL MILITARY EDUCATION (JPME)
Supporting Tasks cont'd

- Joint and combined warfare
- National military strategy
- National security strategy
- Resourcing the Armed Forces
- Theater strategy
- Inter-agency processes
- Mobilization and reconstitution planning

E-8

ETMO M&S REQUIREMENTS WORKSHOP
EDUCATION WG

CONTINUING PROFESSIONAL EDUCATION
Supporting Tasks

Conduct degree and non-degree education in military and non-military subject areas

Subject areas can be divided for this purpose into
- M&S supported
- Non M&S supported (not further defined)

M&S supported subject areas include:
- Principles of M&S (not further defined here)
- Applications of M&S to the military

Essentially contains the same set of supporting tasks identified elsewhere in this report.

ETMO M&S REQUIREMENTS WORKSHOP
EDUCATION WG

RESIDENT EDUCATION ENVIRONMENT

- Time constrained
- Decision - making vs decision - implementation
- Limited resources for support
- Diverse skills and background of participants
- Limited non-host Service student representation
- Seminar based (sized)
- Concurrent, multiple, independent educational experiences
- Individual study/research
- Lack of required service specialties
- U.S. and international audience
- (3 or 4)/1 student/faculty ratio

RESIDENT EDUCATION ENVIRONMENT - cont'd

- Time continuum from past thru future
- Events represent weeks/months (time compressed)
- Process and principles vs product
- Biased against technology/cultural bias
- Unconstrained ideas and concepts
- Primacy of educational objectives
- Focus on operational and higher
- Immediate results
- Role playing
- Internetted PME

E-11

NON-RESIDENT EDUCATION ENVIRONMENT

All items from RESIDENT EDUCATION ENVIRONMENT apply except:

- Correspondence specific
  - Self-paced
  - No/limited access to faculty, other students

- Seminar specific
  - May be time-constrained
  - Variable access to faculty, other students

- U.S. and international audience

- Internetted PME

E-12

SUPPORTING TASKS WHERE M&S COULD BE APPLIED

- Joint PME
  - National Security strategy
    - National resource allocation - Create/Identify
    - National mobilization/reconstitution planning - Create/
      Identify
  - National Military Strategy
    - Resourcing the Armed Forces - Improve
    - Acquisition - Improve
  - Theater Warfare - Improve
- Service Specific PME
  - Quality and Change Management - Create/Identify

E-13

THEATER WARFARE

- Model space
- Model technology advances
- Improve sustainment modeling
- Improved strategic targeting effects
  - non military
  - effect on fielded military forces
- Model Special Ops
- Scalability by component command play
- Variable time ratios, high speed, event-stepped and
  monitorable
- Easy scenario build (terrain, forces, weather)
  - self scenario build
  - exogenous data base inputs (interfaces)
- Non-expert interface

E-14

THEATER WARFARE - cont'd

- Results that can be manipulated
  - re-baseline model
- Two sided (with expert system play possible)
- Include intel and recon
- PC (desktop) based family of models in support of JPME
- Improved mobilization modeling
- Common user interface
- Exportable software
- Improved deployment modeling
- Include communication assessment within model (C4I)
- Inter-agency operations

E-15

Theater Warfare Models(s)
Improve

- Subject Areas:
  - C4I and Recon
  - Mobilization
  - Deployment
  - Air / Land / Sea / Space / Special Ops / Amphib Ops
  - Log / Sustainment
  - Interagency Ops
  - War termination
  - Coalition building and maintenance
  - Political / Military interaction
  - EW
  - Planning Process

E-16

Theater Warfare Model(s) Characteristics

- Variable input/output by friendly and opposing forces by component
- Highest level of resolution both friendly and opposing forces
    - Air Force - flights
    - Army - battalions
    - Navy - ships
    - Marines - MEUs
    - Special Ops - teams
- Geographic capability: notional terrain thru anywhere in the world
- Geographic resolution: global to 1:250,000
- Speed: real time to 30 days in an hour

E-17

Theater Warfare Model(s) Characteristics cont'd

- Event stepped
- Monitorable
- Interruptible
- Ability to re-baseline
- Single model capable of multiple (at least 2) conflicts
- Ability to build own scenario database, interface to other databases, modify database easily
- Provide game truth, blue perspective, red perspective
- Non-expert interface, common interfaces
- Modular, expert systems (with learning ability)
- Briefing (or other) compatible post processor
- Graphical output

E-18

National Resource Allocation Model
Create / Identify

- Subject Areas:
  - National Budget
  - Demographics
  - Budget Process
  - Political Environment
  - National Debt
  - Economics (international and national)
- Characteristics:
  - PC based
  - Common and non-expert interface
  - Graphical output
  - Rapid feedback
  - Easily maintained database
  - Interface to the National Mobilization / Reconstitution Planning Model
  - Interface with Resourcing the Armed Forces Model

E-19

National Mobilization / Reconstitution
Planning Model - Create/Identify

- Subjects Areas:
  - Industrial base
  - Demographics
  - Political environment
  - Foreign technical reliance
  - Threat based capability
  - Existing military infrastructure
  - National budget
- Characteristics:
  - PC based
  - Common and non-expert user interface
  - Easily maintained database
  - Rapid feedback
  - Interface with National Resource Allocation Model

E-20

Resourcing the Armed Forces Model - Improve

- Subject Areas:
  - PPBS
  - Force structures
  - Readiness / OPTEMPO
  - Research and Development
  - Manpower
  - Sustainment
  - AC / RC Mix
  - Infrastructure
- Characteristics:
  - PC based
  - Common and non-expert user interface
  - Easily maintained database
  - Rapid feedback
  - Interface with National Resource Allocation Model
  - Interface to Theater Warfare Model(s)

E-21

Acquisition Model(s) - Improve

- Subject Areas:
  - Contracting
  - Project management
  - Risk analysis
- Characteristics:
  - PC based
  - Common and non-expert interface user interface
  - easily maintained database
  - Rapid feedback
  - Graphical output
  - Interface to Resourcing the Armed Forces Model
  - Interface to Mobilization / Reconstitution Model

E-22

Quality Management Model
Create / Identify

- **Subject Areas:**
  - Process
  - Product
  - Customer
  - Work force
  - Management
- **Characteristics:**
  - PC based
  - Common and non-expert interface user interface
  - easily maintained database
  - Rapid feedback
  - Graphical output

E-23

ISSUES

- **Establish M&S as a additional skill identifier.**

- **Education of M&S practitioners, users,
  project managers and senior executives**
  - Establishment of educational foundation for
    employment and advancement of M&S technology
    across all functional areas
  - Strengthen M&S education in PME and continuing
    education

E-24

DEFINITIONS

Professional Military Education (PME). PME provides individuals with the skills, knowledge, and understanding that enable them to make sound decisions in progressively more demanding command and staff positions within the national security environment. PME has as its primary theme the employment of combat forces, with strategy being increasingly emphasized at the intermediate, senior, and general/flag officer levels. PME addresses the military, political, social, and psychological dimensions of national security with varying degrees of emphasis on the planning and conduct of war, Service organizations, joint and combined operations, force employment and deployment concepts and military leadership.

Joint Professional Military Education (JPME). JPME addresses the integrated employment of air, land, sea, space, and special operations forces at all levels of war.

Continuing Professional Education (CPE).

– **Graduate Education (MS-PhD)**

– **Professional Continuing Education (PCE).** Oriented primarily toward college educated, officer-level personnel. Designed to add to the student's general, functional body of knowledge at various career phases. Typically done in a resident mode and intended to develop a professional, not teach a skill.

Common Characteristics

- PC based
- Common and non-expert interface user interface
- Easily maintained database
- Rapid feedback
- Graphical output
- Event-stepped

In a Nutshell

- Education is different than training
- There are common needs among educators
  - Ease, aggregation, speed, event-stepped, ...
- Existing and planned training models are unwieldy
- Impact on over 50,000 officers annually

BOTTOM LINE

Education of military leaders offers the greatest potential for improving the effectiveness of DoD - -

M&S contributes significantly to the educational process

E-27

APPENDIX F

DESIRED M&S CHARACTERISTICS

MISSION PLANNING/REHEARSAL WORKING GROUP

DESIRED
M&S CHARACTERISTICS
DERIVED FROM METLs

F-1

Hierarchy
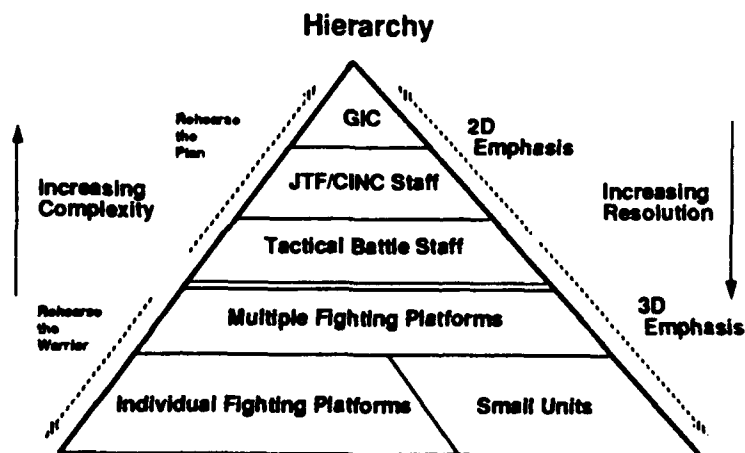
Major assumption: Personnel are already trained and "combat ready"

F-2

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

ASSUMPTIONS

- No soldier, sailor, marine, or aviator a training tool

- Every one comes to the party already trained

- Continuum is Training-Mission Planning-Mission Rehearsal
  - Mission Execution

- Multi-level security must be effective

- M & S can help eliminate some inefficient or ineffective ways
  of doing business

F-3

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

Definitions

- Allow Planning, Rehearsal, and Evaluation of Specific Missions with
  an emphasis on Tactics, Situational Awareness, Decision Making, and
  Coordination

- Simulation of a military mission to improve the probability
  of mission success by verifying the mission plan and increasing crew
  familiarity with mission plan and area

- Is location specific and will integrate mission planning into an environment
  created to reflect, as realistically as possible, how the real world is
  expected to be in order to give a sense of déjà vu afterwards,
  during the actual mission

F-4

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

MISSION ESSENTIAL TASK LIST

Grenada
- **Air Force:MC-130Es; AC-130Hs, CCT**
- **Marines: AH-IT, H-46, H-53s-Ground Forces**
- **Army: H-60s, Rangers, 82nd Airborne**
- **Navy: H-3s; A-7s; Surface Ships, GICs**

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

MISSION ESSENTIAL TASK LIST

1 **Conduct Small Unit P & R**
2 **Conduct Individual Fighting Platforms**
3 **Conduct Multiple Fighting platforms P & R**
4 **Conduct Tactical Battle Staff P & R**
5 **Conduct Joint Task Force or CINC Staff P & R**
6 **Conduct Command Level P & R**

(aviation, maritime, surface, subsurface, land, or space based) (deployable)

SUPPORTING TASKS TO METL# 1

Conduct Small Unit P & R

Plan (Mission Analysis):
- Objective Analysis
- Threat Analysis
- Movement to the Objective
- Mission Execution
- Movement from Objective
- Support Analysis

SUPPORTING TASKS TO METL# 1

Conduct Small Unit P & R

Rehearsal:
- Approach to Objective
- Actions on Objectives
- Withdraw from Objective
- Assessment
- Provide Feedback

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

SUPPORTING TASKS TO METL# 2

Conduct Individual Fighting Platform P & R

Plan (Mission Analysis):
- Objective Analysis
- Threat Analysis
- Movement to the Objective
- Mission Execution
- Movement from Objective
- Support Analysis

F-9

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

SUPPORTING TASKS TO METL# 2

Conduct Individual Fighting Platform P & R

Rehearsal:
- Approach to Objective
- Actions on Objectives
- Withdraw from Objective
- Assessment
- Provide Feedback

F-10

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

SUPPORTING TASKS TO METL# 3

Conduct Multiple Fighting Platform P & R

Plan (Mission Analysis):
- Objective Analysis
- Threat Analysis
- Movement to the Objective
- Mission Execution
- Movement from Objective
- Support Analysis
- Deconfliction
- C4I
- Integrate Distinctly different platforms/units

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ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

SUPPORTING TASKS TO METL# 3

Conduct Multiple Fighting Platform P & R

Rehearsal:
- Approach to Objective
- Actions on Objectives
- Withdraw from Objective
- Deconfliction
- C4I
- Integrate Distinctly different platforms/units
- Assessment
- Provide Feedback

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ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

SUPPORTING TASKS TO METL# 4

Conduct Tactical Battle Staff P & R

Plan
- Mission Analysis
- Construct Battle Plan
- Target Prioritization/Asset Allocation
- COA Development
- Staff Functions, e.g., intel, operations, logistics, personnel, medical, etc
- Agency Coordination

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ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

SUPPORTING TASKS TO METL# 4

Conduct Tactical Battle Staff P & R

Rehearsal:
- Course of Action Assessment
- Staff Assessment
- External Coordination & Influence
- Plan Verification
- Refinement
- Provide Feedback

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ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

SUPPORTING TASKS TO METL# 5

Conduct Joint Task Force / CINC Staff P & R

Plan:
- Analysis of Political Objectives
- Development of Campaign Plan
- Staff Functions
- Agency Coordination
- Combined/Coalition Warfare
- Force mix/allocation
- COA Development

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

SUPPORTING TASKS TO METL# 5

Conduct joint task force / CINC Staff P & R

Rehearsal:
- COA Assessment
- Force Mix Assessment
- Staff Assessments
- Test C4I
- Component Deconfliction
- Provide Feedback

SUPPORTING TASKS TO METL# 6

Conduct command level P & R

Plan:
- Develop Strategy/Guidance
- Campaign Development/Oversight
- Political Interaction
- Component/Allied Interaction

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SUPPORTING TASKS TO METL# 6

Conduct command level P & R

Rehearsal:
- Preview Critical Events
- Campaign/Strategy Verification
- Provide Feedback

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ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S Environment for METL # 1

Small Unit P&R Objectives:
- Develop task methodology
- Develop and select COA (P)
- Assess and verify COA (R)
- Develop and verify timing and coordination
- Develop situation awareness
- Provide feedback to team commanders

Audience:
- Seal Teams (14)
- Spec Forces (12)
- Sec Forces (4-30)
- Law Enforcement
- General Purpose Infantry
- 50 man reinforced dismounted platoon
- Engineering squad

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S Environment for METL # 1

Scenario Events:
- Military operations in urban terrain
- Attack defend fortified positions
- Direct action
- Hostage operations
- Security operations
- Recon Ops

Blue Participation:
- Supporting arms assets, e.g., arty, mortars, CAS, etc
- Transportation
- C4I

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S Environment for METL # 1

Red/Grey Participation:

- Expected actions of enemy
- Scenario dependent
- Human/enemy behavior representation
- Small units/platforms
- Detailed Object level representation

Geography:

- Surface, subsurface, and air
- Highest fidelity/detail (>1Ft)
- Maximize tactical awareness
- Environment (obscurants, weather, day/night, etc)
- Terrain types (MOUT, mountains, jungles, deserts, etc)

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S Environment for METL # 1

Time:
- Mission is situation dependent
- Less than real time, real time, greater than real time
- COA - 10 minutes or less
- Rehearsal- less than real time

Where:
- Home base
- Deployable (Version subsets)

Deficiencies:
- Limited number
- Fidelity is not good
- Poor environment representation
- Data Bases: limited sources/no common
- Lack of force integration
- Incompatible with C4I
- Little emphasis on subsurf/airborne
- Lack of organic support
- Poor human representation

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S Environment for METL # 2

Individual Platform P&R Objectives:

- Develop task methodology
- Develop and select COA (P)
- Assess and verify COA (R)
- Develop and verify timing and coordination
- Develop situation awareness
- Platform performance
- Provide feedback to crew and team commanders

Audience:

- Tank crew
- LAV crew
- Aircraft crew
- Ship/sub crew

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S Environment for METL # 2

Scenario events:

- Mech assault
- CAS
- Precision strike
- Maritime interdiction/blockade

Blue Participation

- Supporting arms assets
- Other platforms
- C4I

M&S Environment for METL # 2

Red/Grey Participation:

- Expected actions of enemy
- Scenario dependent
- Human/enemy behavior representation
- Small units/platforms
- Detailed Object level representation

Geography:

- Surface, subsurface, and air
- High fidelity/detail (<1 Ft)
- Maximize tactical awareness
- Environment (obscurants, weather, day/night, etc)
- Terrain types (MOUT, mountains, jungles, deserts, etc)

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M&S Environment for METL # 2

Time:

- Mission is situation dependent
- Less than real time, real time, greater then real time
- COA - 10 minutes or less
- Rehearsal- less than real time

Where:

- Home base
- Deployable (Version subsets)

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M&S Environment for METL # 2

Deficiencies:
- Affordability
- Limited number
- Fidelity is not good
- Visual sensor correlation difficult
- Not user friendly
- Poor environment representation
- Data Bases: limited sources/no common
- Lack of force integration

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M&S Environment for METL # 3

Multiple Fighting Platforms P&R Objectives:
- Develop task methodology
- Develop and select COA (P)
- Assess and verify COA (R)
- Develop and verify timing and coordination
- Develop situation awareness
- Deconfliction planning/rehearsal
- Platform performance
- Exercise C4I
- Provide feedback to all players and commanders

Audience:
- Tank crew
- LAV crew
- Aircraft crew
- Ship/sub crew

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ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S Environment for METL # 3

Scenario Events:

- Coordination operations of individual fighting platforms and/or
  small units at the engagement level

Blue Participation:

- C4I
- Supporting arms
- Space systems

Red/Grey Participation:

- Expected actions of enemy
- Scenario dependent
- Human/enemy behavior representation
- Small units/platforms
- Detailed Object level representation
- Integrated theater environment

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S Environment for METL # 3

Geography:

- Surface, subsurface, and air
- High fidelity/detail (<1Ft)
- Maximize tactical awareness
- Environment (obscurants, weather, day/night, etc)
- Terrain types (MOUT, mountains, jungles, deserts, etc)
- Larger AO
- Varying fidelity to meet the need of each platform

Time:

- Mission is situation dependent
- Less than real time, real time, greater than real time
- COA - 10 minutes or less
- Rehearsal- less than real time

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S Environment for METL # 3

Where:
- Home base
- Deployable (Version subsets)

Deficiencies:
- Very few
- Limited fidelity
- Limited capability
- Not build to network standards
- Non compatible with C4I

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S Environment for METL # 4

Tactical Battle Staff P&R Objectives:
- Develop task methodology
- Develop and select COA (P)
- Assess and verify COA (R)
- Develop and verify timing and coordination
- Develop battle awareness
- Deconfliction planning/rehearsal
- Platform performance
- Provide feedback to units, staff and commanders
- Exercise C4I

Audience:
- Battalion to brigade level staff
- Battle group staff
- Wing staff

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S Environment for METL # 4

Scenario Events:
- Larger AO
- One scenario with multiple missions
- Coordination of multiple units and related staffs

Blue Participation:
- C4I
- Supporting arms
- Other units and assets
- Other agencies

Red/Grey Participation:
- Expected actions of enemy
- Scenario dependent
- Human/enemy behavior representation
- Small units/platforms
- Detailed Object level representation
- Integrated theater environment
- Integrated response

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S Environment for METL # 4

Geography:
- Larger AO
- Medium to high fidelity

Time:
- Mission is situation dependent
- Less than real time, real time, greater than real time
- COA - 10 minutes or less
- Rehearsal- less than real time (run time)

Where:
- Home base
- Deployable (Version subsets)

Deficiencies:
- Very few
- Limited fidelity
- Limited capability
- Not build to network standards
- Non compatible with C4I
- Integration of space assets

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S Environment for METL # 5

JTF/CINC Staff P&R Objectives:
- Develop task methodology
- Develop and select COA (P)
- Assess and verify COA (R)
- Develop and verify timing and coordination
- Develop campaign/theater awareness
- Deconfliction planning/rehearsal
- Platform performance
- Provide feedback to components
- Exercise C4I

Audience:
- JTF/CINC level staff

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S Environment for METL # 5

Scenario Events:
- Larger AO
- Multiple scenario with multiple missions
- Coordination of multiple units and related staffs
- Regional conflicts
- Nuclear war
- Social, political, and economic

Blue Participation:
- C4I
- Other units and assets
- National agencies
- Combined and coalition forces

M&S Environment for METL # 5

Red/Grey Participation:

- Expected actions of enemy
- Scenario dependant
- Human/enemy behavior representation
- Command response/strategy
- Detailed object level representation
- Integrated theater environment
- Integrated response

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M&S Environment for METL # 5

Geography:

- Larger AO - up to theater
- Low - options to high fidelity

Time:

- Mission is situation dependant
- Real time or greater than real time
- COA - 10 minutes or less (run time)

Where:

- Home base
- Deployable (Version subsets)

Deficiencies:

- Limited capability for other than conventional
- Lack of compatibility and commonality

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M&S Environment for METL # 6

GIC P&R Objectives:
- Achieve national objectives
- Preview and presentation of plan
- Campaign "following" feedback

Audience:
- GIC

Scenario Events:
- Theater
- Multiple scenario with multiple missions
- Regional conflicts
- Nuclear war
- Social, political, and economic

Blue Participation:
- C4I
- Other units and assets
- National command authority
- Combined and coalition forces

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M&S Environment for METL # 6

Red/Grey Participation:
- Expected strategic actions of enemy
- Political economic and military response
- Scenario dependent
- Command response/strategy

Geography:
- Larger AO - up to theater
- Low - options to high fidelity

Time:
- Greater than real time
- COA - 10 minutes or less (run time)

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M&S Environment for METL # 6

Time:
- Mission is situation dependent
- Real time or greater than real time
- COA - 10 minutes or less (run time)

Where:
- Home base
- Deployable

Deficiencies:
- Limited capability for other than conventional
- Need political, social, and economic models
- Lack of compatibility and commonality

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M&S CHARACTERISTICS & ATTRIBUTES

- COMMON (JOINT) DATA BASES & MODELS

- M&S DATA SHOULD EVOLVE FROM REAL WORLD SOURCES
  WITH INTERFACES TO C4I

- COMMON THREAT MODELS FROM R/G: SMALL UNIT TO GIC

- BEHAVIORAL REPRESENTATION IN THREAT SPECIFIC MODELS
  AND NONADAPTIVE BEHAVIORS FOR BLUE (CRITICAL TASKS)

- SOCIAL, ECONOMICAL, & POLITICAL MODELS

- MODELS TO ADDRESS SPECTRUM OF CONFLICT FOR ALL
  REGIONS OF THE WORLD (WEAK & STRONG)

- DISTRIBUTED, INTEROPERABLE, OPEN SYSTEM
  ARCHITECTURE WITH OBJECT LEVEL ORIENTATION
  - - STANDARDS, COTS, & GOTS

- MULTI-LEVEL SECURITY IS ESSENTIAL

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ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S CHARACTERISTICS & ATTRIBUTES

- ACCESSIBLE FOR PLANNING, ANALYSIS, TRAINING, TESTING, REHEARSAL & FIGHTING ON COMPATIBLE SYSTEMS

- WELL DEFINED INFRASTRUCTURE WITH EASY ACCESS TO DATA MODELS & OTHER INFORMATION

- DEPLOYABLE & ACCESSIBLE IN ALL CASES

- REACTION TIME RESPONSIVE TO USER NEED & SUPPORTIVE OF OPTEMPO

- AFFORDABILITY OF FULL TIME DSI TO USERS IS AN ISSUE

- MAN-MACHINE INTERFACE: STANDARD LOOK & FEEL

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ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

M&S CHARACTERISTICS & ATTRIBUTES

SINGLE SOURCE OF DATA	JOINT POC
TERRAIN DMA LEVEL 2	DMA
CULTURAL DMA LEVEL 2	DMA
MODELS	DMA
IMAGERY	
COMM.	DIA
NATIONAL	DIA
THREAT	
EOD	JEWC
AOB	DIA
GOB (R/B/G)	DIA
MULTI-LEVEL SECURITY	NSA
WORLD WIDE DB	?
JOINT INTEROP	DMSO
JOINT STANDARDS	DMSO
DSI NETWORK	DMSO / DISA
DEPLOYABLE	SERV PM
CONNECTIVITY (UP & DOWN)	SERV PM

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ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

SUMMARY/RECOMMENDATIONS

° M&S MAKES MISSION PLANNING & REHEARSAL AN EVERY DAY
  CAPABILITY
°° REAL WORLD ENVIRONMENT VERSUS CONUS "LOOK ALIKE"
  AREA

° GREATEST IMMEDIATE NEED IS FOR WARRIORS THEN
  COMMANDERS

° MISSION SUCCESS COSTS MONEY $$$
°° WHAT PRICE IS MISSION SUCCESS ?
°° INVEST NOW, LEVERAGE DSI, C4I, P2851, ...
°° AFFORDABLE "USER FEES" FOR SMALLEST USERS

ETMO M&S REQUIREMENTS WORKSHOP
MISSION PLANNING/REHEARSAL WG

P&R M&S CHARACTERISTICS & ATTRIBUTES
BOTTOM LINE

° SINGLE SOURCE OF VALIDATED DATA (e.g., TERRAIN,
  THREAT,...)
°° ONE STOP SHOPPING (DMA, DIA, NSA, ...)
°° JOINTLY MANAGED & FUNDED
°° SAVES $$$, AVOIDS DUPLICATION & REINVENTION OF WHEEL

° NEED BETTER DATA
°° TERRAIN & CULTURE BETTER THAN DMA LEVEL 1
°° OBs, C4I
°° QUALITY SOURCE IMAGERY (LANDSAT, SPOT & NATIONAL)
°° WEATHER & SPECIAL EFFECTS MODELING

° USER FRIENDLY !